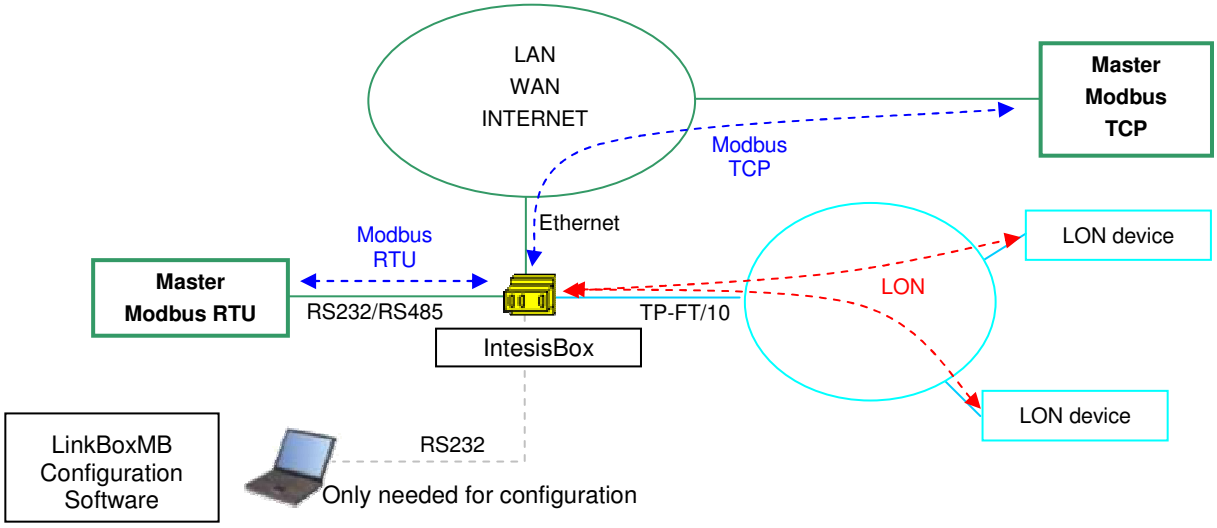
IntesisBox®
Modbus Server - LON

Gateway for integration of LON devices into Modbus enabled control systems.

Integrate Air Conditioning from the main manufacturers (DAIKIN, Mitsubishi Electric, Mitsubishi Heavy Industries, LG electronics, Toshiba, Fujitsu General…) into your Modbus enabled control system (BMS, SCADA, PLC, HMI, TouchPanels, AMX, Crestron…).



IntesisBox is a Modbus device allowing read/write network variables (SNVTs) of LON devices connected to a LON network, and offering these values through its Modbus interface. SNVT values in LON can be read/write from Modbus. *Each LON basic data type of network variables in LON devices can be mapped into an individual Modbus register.*

LON interface of IntesisBox reads continuously LON devices configured by polling. LON devices can be addressed either using Neuron-Id (physical address) or subnet/node for commissioned networks. IntesisBox has the ability to declare devices as commissioned, if needed, thus avoiding the need for a LON integration tool for commissioning (i.e. LonMaker). *All the updated readings are maintained in IntesisBox memory for immediate interaction with the Modbus system when requested.*

Modbus interface of IntesisBox supports Modbus TCP or Modbus RTU (RS232 or RS485), software configurable, and acts as a Modbus slave device.

IntesisBox Modbus Server series are configured using LinkBoxMB, a software tool for windows™ which is supplied along with the purchase of IntesisBox with no additional cost. *Demo configuration files are also supplied for LinkBoxMB with no additional cost, making the configuration of IntesisBox for integration of many brands of air conditioning (DAIKIN, Mitsubishi Heavy, Mitsubishi Electric, Toshiba, Fujitsu-General, Samsung, LG…) extremely easy and quick, almost plug & play.*

IntesisBox capacity

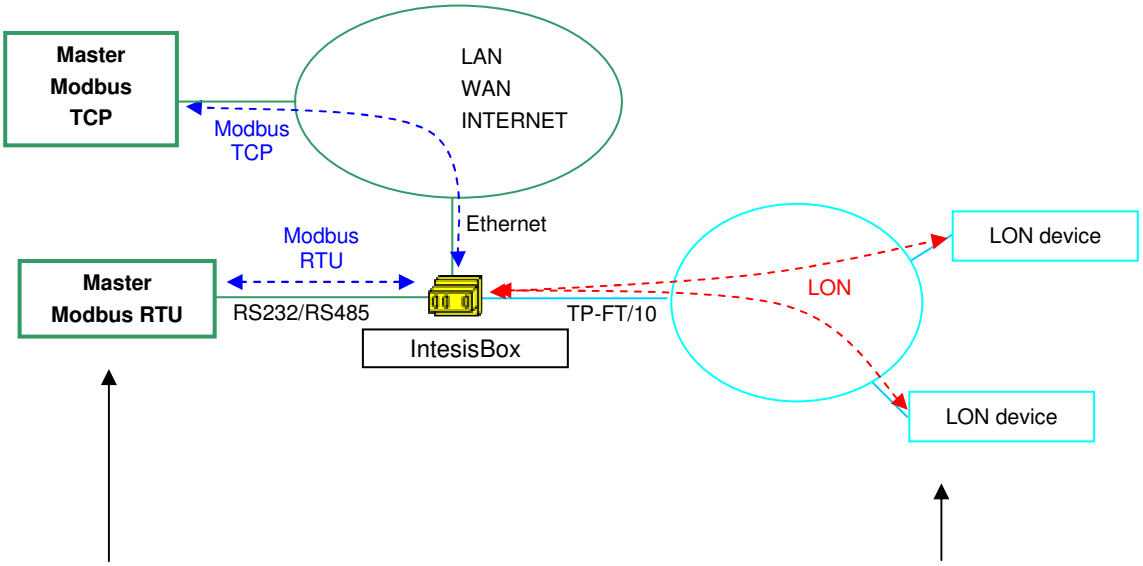
Element	Max. (Basic version)	Max. (Extended version)	Notes
Type of LON devices			Those supporting *Free Topology* channel (FT-10)
Supported number of LON network variable fields	500	4000	Maximum number of points (Modbus registers) that can be defined into IntesisBox. Each of them can contain an individual field from a LON network variable.
Supported number of LON devices	64	128	Maximum number of different LON devices that can be defined into IntesisBox (to read/write points into them).

There are two different models of *IntesisBox® Modbus Server - LON* with different capacity each.

- Basic, allowing integration of 500 points and up to 64 LON devices. *Ref.: IBOX-MBS-LON-A*
- Extended, allowing integration of 4000 points and up to 128 LON devices. *Ref.: IBOX-MBS-LON-B*

Sample applications

Integration of any LON device or system into Modbus enabled control systems.



Control system with Modbus master interface:

- BMS.
- SCADA.
- PLC.
- DDC.
- HMI.
- TouchPanles
- AMX, Crestron…

Typical LON devices or Systems equipped with LON interface:

- Air conditioners (Daikin, Mitsubishi Electric, Mitsubishi Heavy Ind, Toshiba, LG…).
- Chillers.
- Heaters.
- Thermostats.
- Fan coil controllers.
- Room controllers.
- Power meters.
- Energy meters.
- Building Control Systems (BMS).
- Programmable Logic Controllers (PLC).

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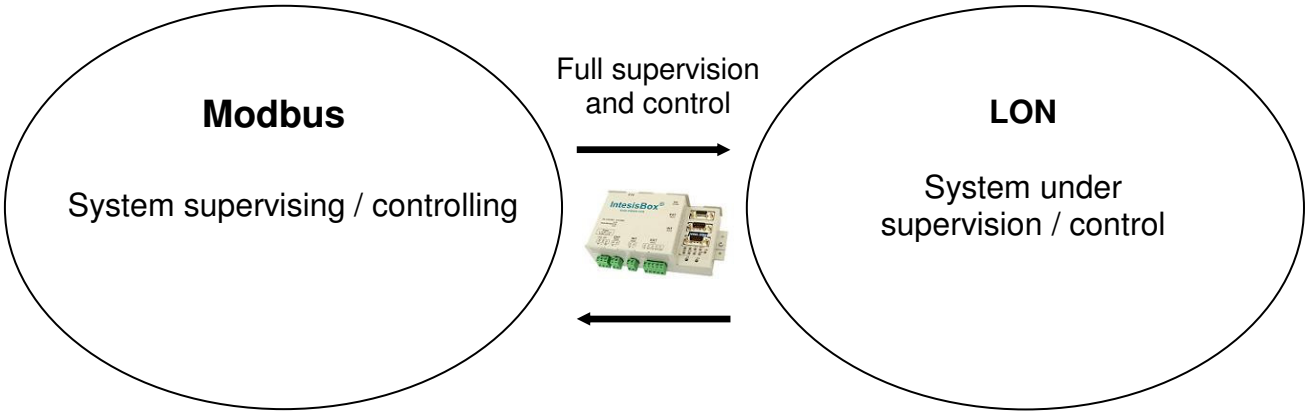
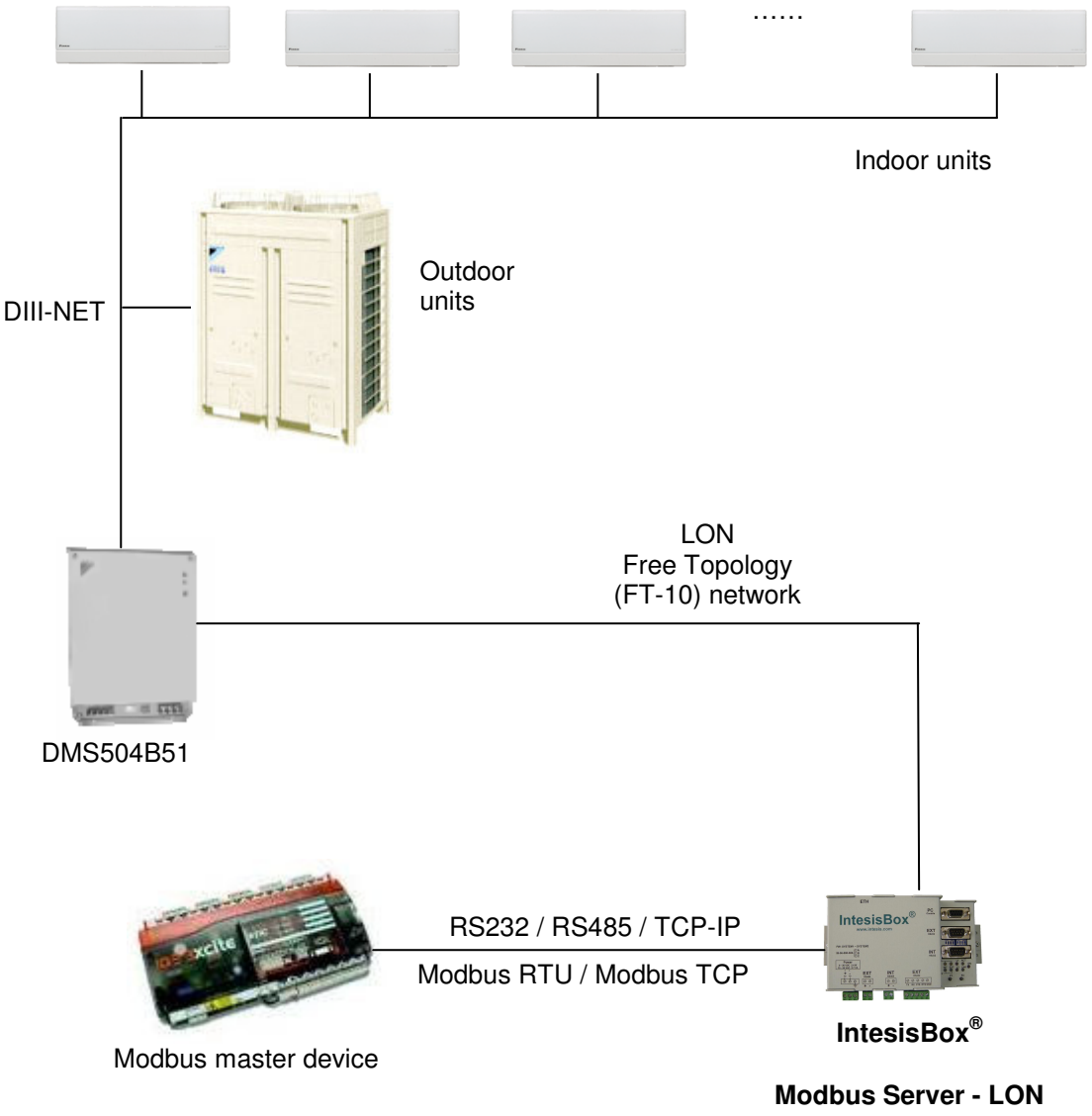


Typical applications

Integration of Daikin VRV Air Conditioning into Modbus enabled control systems.

For this application, Daikin VRV Air Conditioning system must be equipped with Daikin LON gateway (model DMS504B51), this Daikin gateway is normally commissioned by Daikin technical personnel, contact your nearest Daikin distributor for details.



In the technical documentation of IntesisBox supplied with the device, extended details on how to configure IntesisBox for this application is provided.

Intesis Software provides sample projects for IntesisBox with specific configuration to integrate any brand of air conditioning with LonWorks connectivity, with these sample projects the configuration and commissioning of IntesisBox for this kind of application becomes easy and quick, almost plug & play.

Modbus interface of IntesisBox

Functions supported

- Modbus functions 03 and 04 (*read holding registers* and *read input registers*) can be used to read Modbus registers.
- Modbus functions 06 and 16 (*Single Multiple Holding Registers* and *Write Multiple Holding Registers*) can be used to write Modbus registers.
- If *poll records* are used to read or write more than one register, it is necessary that the range of addresses requested contains valid addresses, if not the corresponding Modbus error code will be returned.
- Modbus error codes are fully supported, they will be sent whenever a non valid Modbus action or address is required.

Data Formats

The Modbus registers can be of 2 bytes (16 bits) or of 4 bytes (32 bits).

- For 2 bytes (16 bits) registers, its content is expressed always in MSB..LSB.
- For 4 bytes (32 bits) registers, its content (the way IntesisBox handles the byte order) can be one of 3 different options, configurable, this has been implemented to avoid problems reading 32 bits registers, because Modbus master systems handle differently byte order of 32 bits registers depending on manufacturer/device.

Modbus data coding formats supported	• 16 bits unsigned • 16 bits signed • 16 bits signed * 10 • 32 bits unsigned • 32 bits signed • 32 bits float

Modbus RTU

- Baud rate can be selected from 1200, 2400, 4800, 9600, 19200, 38400 and 56700. (Data Bits: 8, parity: none, Stop Bits: 1).
- Modbus slave number can be configured. Physical connection (RS232 or RS485) can also be selected.
- Only the lines RX, TX and GND of the RS232 connector are used (TX/RX+ and TX/RX- for RS485).

Modbus TCP

- The TCP port to use can be configured (by default 502 is used).
- The IP address, subnet mask and default router address to use by IntesisBox can be also configured.

Address Map

The Modbus address map is fully configurable, any point in the IntesisBox can be freely configured with the desired Modbus register address.

LON interface of IntesisBox

Specifications

LON supported channel: Free Topology (FT-10)

Configurable addressing options (on a 'per device' basis):
- Subnet / node
- Neuron-Id

Network variable sample rate:
- Below 60ms per network variable (each network variable may contain several fields, which will be mapped to different Modbus registers, if needed).

Supported network variable types:
- All standard network variable types published by LonMark International are directly supported by configuration tool, *LinkBoxMB*.
- Support for user-defined network variable types can be added in each case, by entering their definition in *LinkBoxMB*. In this case, following information needs to be provided:
  - Scale factors: *a*, *b* and *c*
  - Number of fields
  - Basic LON data type of each field

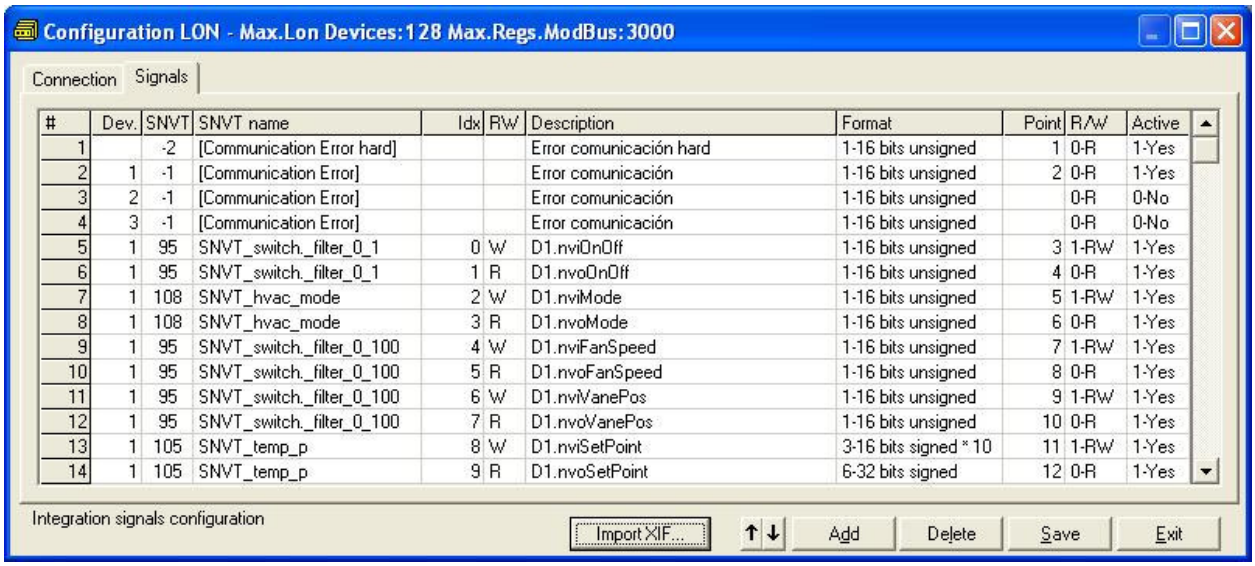
Supported basic LON data types

Basic LON data type	Description
Signed short	8-bit signed data
Unsigned short	8-bit unsigned data
Enum	8-bit unsigned data
Signed long	16-bit signed data
Unsigned long	16-bit unsigned data
Signed quad	32-bit signed data
Unsigned quad	32-bit unsigned data
Float	32-bit IEEE float
Bitfield	1 to 8-bit length unsigned bit field

Configuration tool

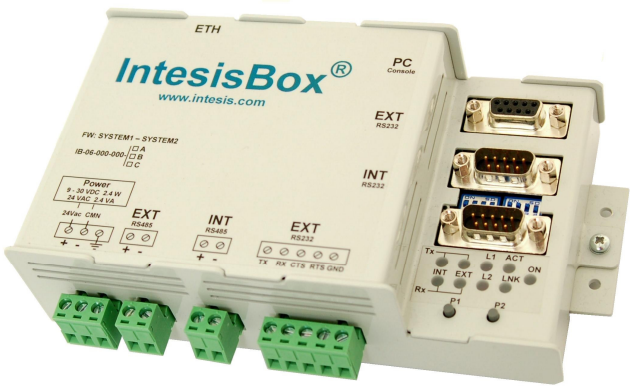
LinkBoxMB	• Visual engineering tool, easy of use, for gateway's configuration and supervision compatible with Microsoft Windows operating systems, supplied with the gateway free of charge. • Multi-window tool allowing to supervise simultaneously the communication activity with both protocols (systems), real time values for all the signals allowing to modify any value (very useful for test purposes), console window showing debug and working status messages, and configuration windows to configure all the gateway's parameters and signals. • Signals configuration in plain text files (tab separated) for easy and quick configuration using Microsoft Excel (very useful in projects with a lot of points). • Allows configuring the gateway's parameters and signals while in off-line (not connected to the gateway). • Connection to the gateway for download the configuration and supervision by using serial COM port of the PC (serial cable supplied with the gateway). • Allows configuring all the external protocols available for IntesisBox® Modbus Server series. • Upgrades for this software tool available free of charge whenever a new protocol is added to the IntesisBox® Modbus Server series. • Multi-project tool allowing having in the engineer's PC the configuration for all the sites with different IntesisBox® Modbus Server series gateways. • Multi-language tool, all the language-dependent strings are in a plain text file (tab separated) for easy modification or addition of new languages. • A list of system commands is available to send to the gateway for debugging and adjust purposes (Reset, Date/time consultation/adjust, Firmware version request…).

In LinkBoxMB, an embedded tool for import XIF files makes the configuration of the IntesisBox for integration of any kind of LON device easy and quick.



#	Dev.	SNVT	SNVT name	Idx	RW	Description	Format	Point	R/W	Active
1		-2	[Communication Error hard]			Error comunicación hard	1-16 bits unsigned	1	0-R	1-Yes
2	1	-1	[Communication Error]			Error comunicación	1-16 bits unsigned	2	0-R	1-Yes
3	2	-1	[Communication Error]			Error comunicación	1-16 bits unsigned		0-R	0-No
4	3	-1	[Communication Error]			Error comunicación	1-16 bits unsigned		0-R	0-No
5	1	95	SNVT_switch._filter_0_1	0	W	D1.nviOnOff	1-16 bits unsigned	3	1-RW	1-Yes
6	1	95	SNVT_switch._filter_0_1	1	R	D1.nvoOnOff	1-16 bits unsigned	4	0-R	1-Yes
7	1	108	SNVT_hvac_mode	2	W	D1.nviMode	1-16 bits unsigned	5	1-RW	1-Yes
8	1	108	SNVT_hvac_mode	3	R	D1.nvoMode	1-16 bits unsigned	6	0-R	1-Yes
9	1	95	SNVT_switch._filter_0_100	4	W	D1.nviFanSpeed	1-16 bits unsigned	7	1-RW	1-Yes
10	1	95	SNVT_switch._filter_0_100	5	R	D1.nvoFanSpeed	1-16 bits unsigned	8	0-R	1-Yes
11	1	95	SNVT_switch._filter_0_100	6	W	D1.nviVanePos	1-16 bits unsigned	9	1-RW	1-Yes
12	1	95	SNVT_switch._filter_0_100	7	R	D1.nvoVanePos	1-16 bits unsigned	10	0-R	1-Yes
13	1	105	SNVT_temp_p	8	W	D1.nviSetPoint	3-16 bits signed * 10	11	1-RW	1-Yes
14	1	105	SNVT_temp_p	9	R	D1.nvoSetPoint	6-32 bits signed	12	0-R	1-Yes

Mechanical & Electrical characteristics

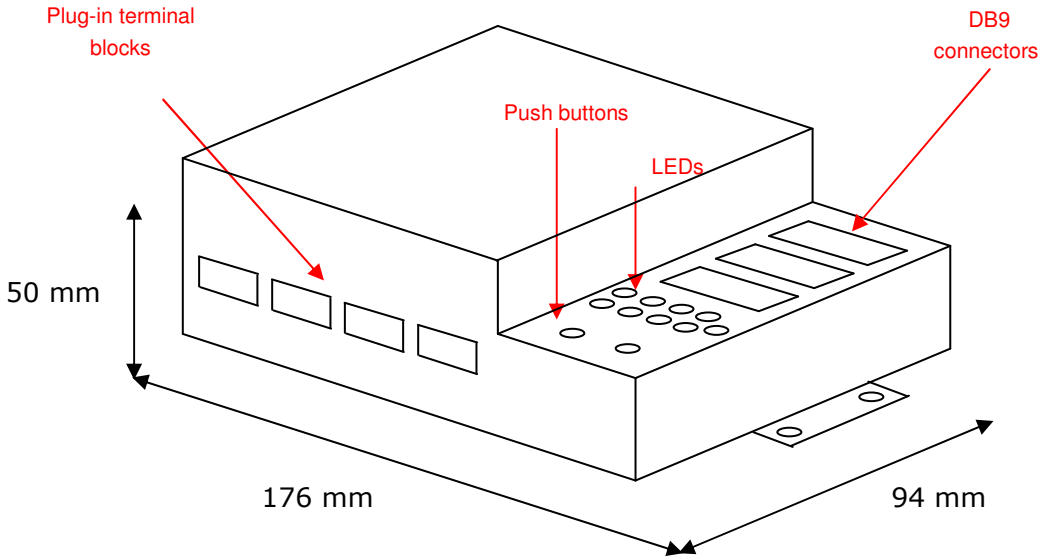


Envelope	Metallic (aluminium). Size: 176mm x 94mm x 50mm.
Color	Grey. RAL 7035.
Power	9 to 30Vdc +/-10% 2.4W. 24Vac +/-10% 2.4VA. Power connector is a 3 poles plug-in terminal block (power + earth).
Mounting options	Desktop Wall DIN rail EN60715 TH35 (using external adapters also supplied with the device).
Modbus RTU ports	1 x Serial RS232 (DB9 male DTE). 1 x Serial RS485 (Plug-in screw terminal block 2 poles).
Modbus TCP port	1 x Ethernet 10BT RJ45.
LON Port	1 x LON (TP-FT/10) (2 poles plug-in screw terminal block).
LED indicators	1 x Power. 2 x LON port activity (Tx, Rx). 2 x Modbus RTU port activity (Tx, Rx). 2 x Ethernet port link and activity (LNK, ACT). 2 x generic use (L1, L2).[1]
Push buttons	2 x generic use (P1, P2).[1]
Console port	RS232. DB9 female (DCE).
Configuration	Via console port.[2]
Firmware	Allows upgrades via console port.
Functional temperature range	-40ºC to +70ºC
Functional humidity range	5% to 95%, non condensation
Protection	IP20 (IEC60529).
RoHS conformity	Compliant with RoHS directive (2002/95/CE).
Certifications	CE

[1] Not used for the moment. Reserved for future use.

[2] Along with the device it is also supplied a standard DB9 male - DB9 female 1.8 m. cable for configuring and monitoring the device using a PC via serial COM port. The configuration software (free of charge), compatible with MS Windows® operating systems, is also supplied with the device.

Dimensions



Recommended available space for its installation into a cabinet (wall or DIN rail mounting), with space enough for external connections: